Florida's Coral Reef Resilience Program Disturbance Response Communications Team

MARINE HEATWAVE, SUMMER 2023

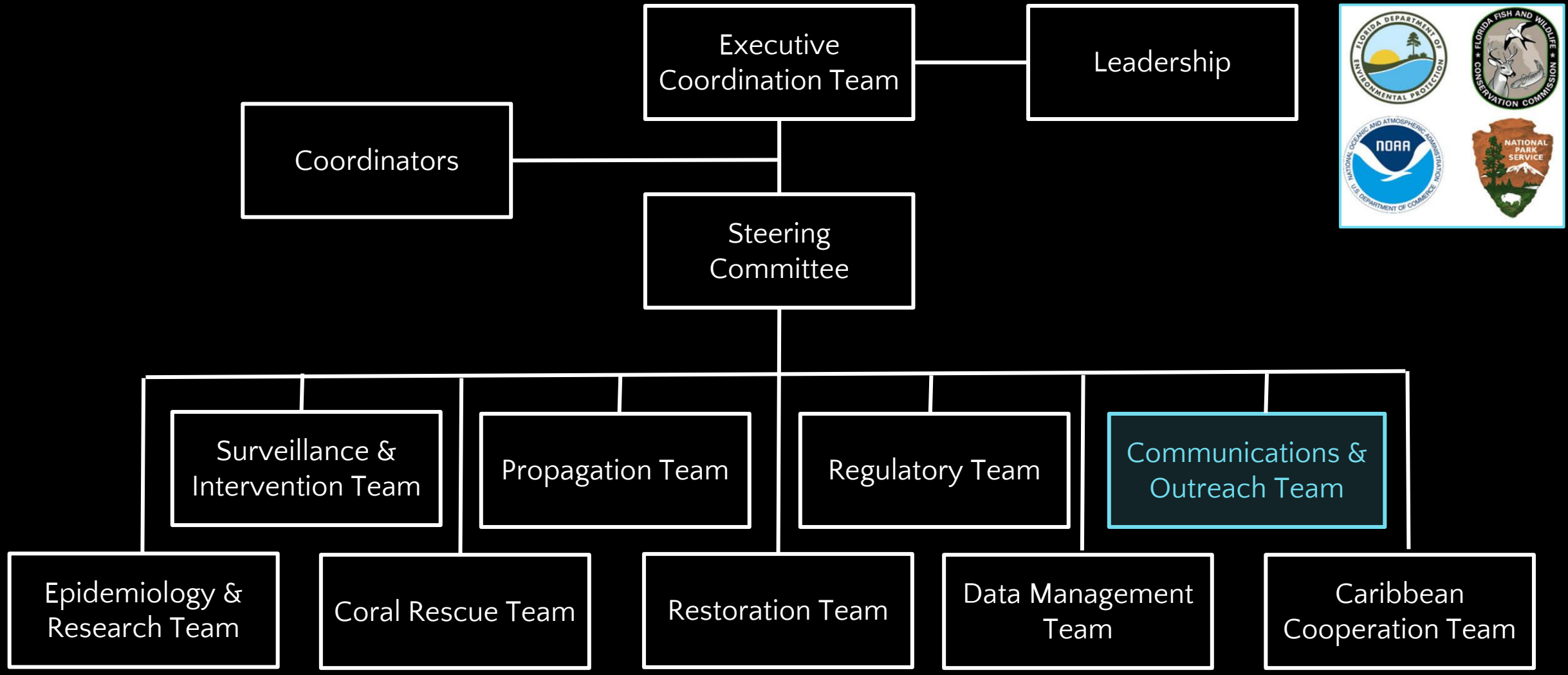
Shelly Krueger, Florida Sea Grant and UF/IFAS Extension, Monroe County and Maurizio Martinelli, Florida Sea Grant

Florida Coral Disease Outbreak Response (FCDOR) Communications & Outreach Team

Impetus: Stony coral tissue loss disease, 2014-2023

Team Objectives

1. All partners communicate similarly about SCTLD.
2. All partners work collaboratively to disseminate information.
3. Communications explain the importance of corals to ecosystem health, shoreline protection, coastal communities, and the economy.
4. Communications inspire and help the public take actions that benefit coral reefs.



Florida Keys National Marine Sanctuary Coral Portal:
floridakeys.noaa.gov/coral-disease/

Branding the Framework

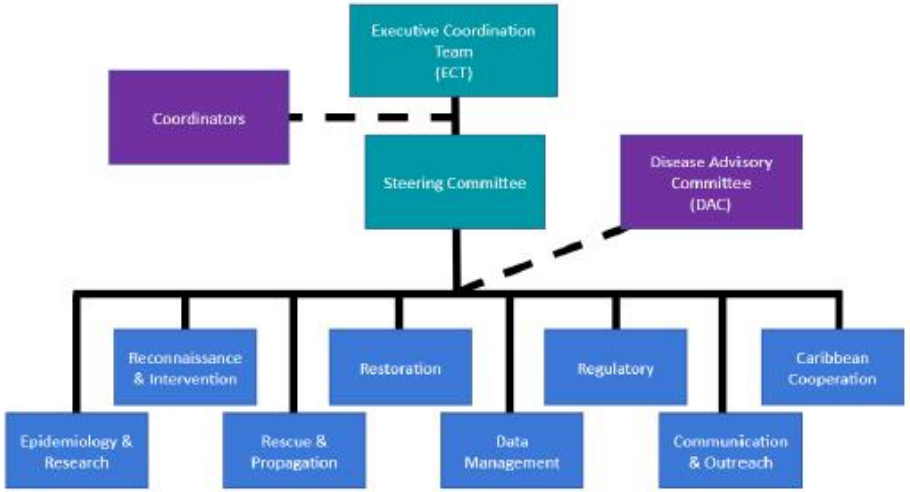
A merger of the SCTLD Response & Florida Reef Resilience Program (FRRP) into…

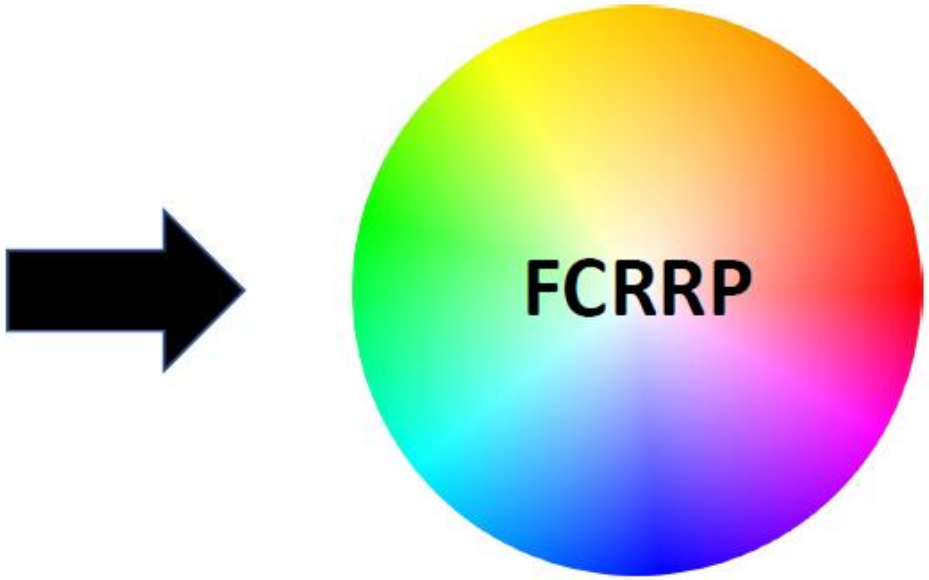
Florida's Coral Reef Resilience Program (FCRRP)

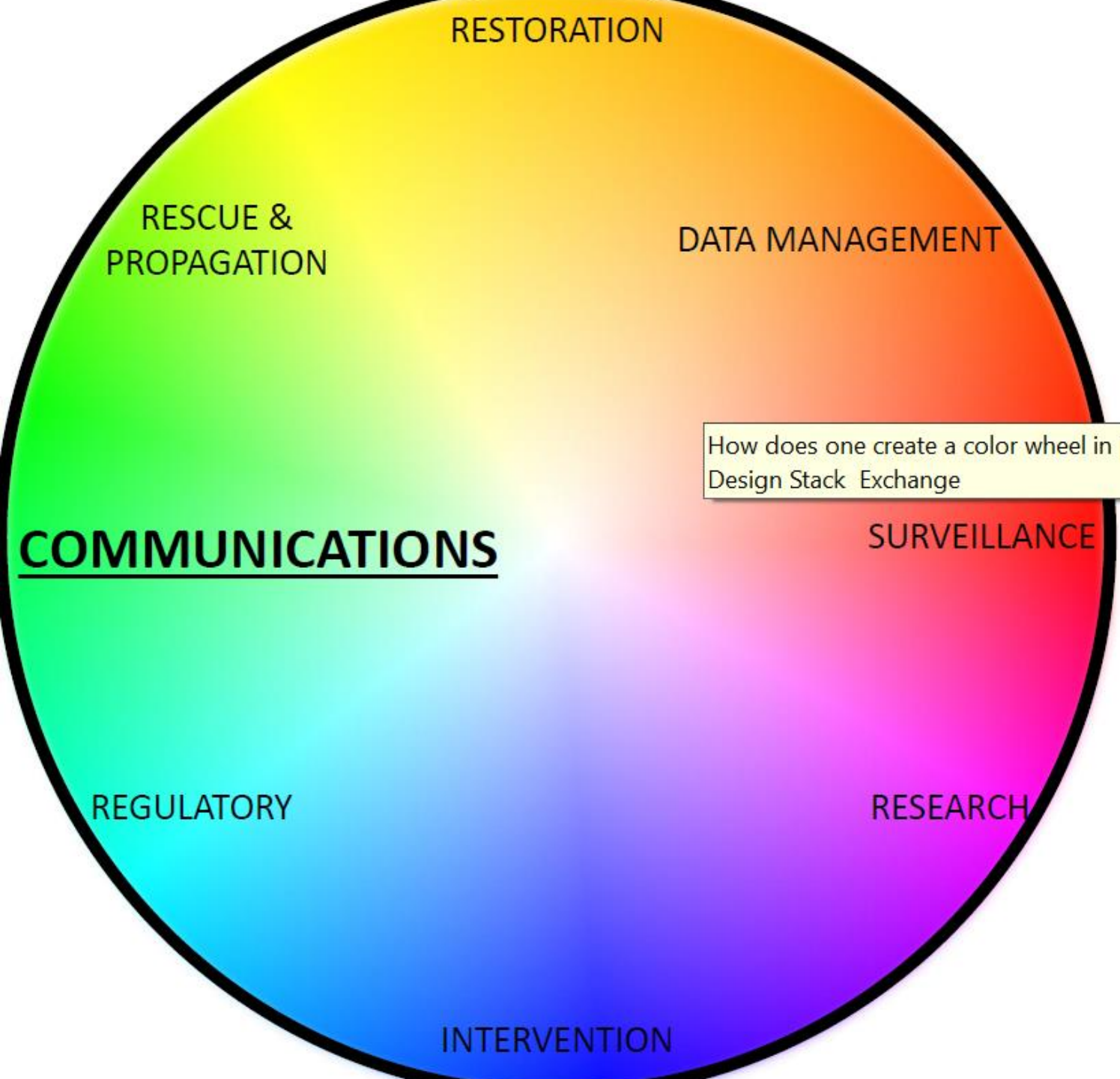
- Keeps connection to FRRP, but shows that it is a new chapter
- Includes the FCR branding
- Offers a shared identity that 'framework' does not

Approach of FCRRP

- Better blend Florida's broad efforts in coral reef conservation and management with the SCTLD Response.
- Build on the SCTLD Response Team organization that has worked so well.
- Encourage further collaboration across Teams.







How does one create a color wheel in Illustrator - Graphic Design Stack Exchange

Common across **all topic areas…**

Facilitate information sharing across all partners

Focal Areas of FCRRP

Disturbance Response

- Maintain SCTLD Response network
- Focus on protocols and rapid mobilization for coral disease (SCTLD, acroporid RTL), bleaching, hurricanes
- Liaise w/ USCRTF, emergency response mechanisms

Ecosystem Restoration

- Focus on coral propagation and outplanting
- Scale up herbivore restoration, for aquarium maintenance and reef restoration
- Liaise w/ statewide planning efforts, CRC, non-FL initiatives

Water Quality

- Liaise w/ SFERTF CCT who are looking into the *where* and *when* of WQ monitoring. Focus on *what* to monitor, and *how best* to monitor those.
- Support WQ improvement initiatives/projects

Communications & Outreach Core Team

- Maya Bhalla-Ladd, Florida Department of Environmental Protection
- Shelly Krueger, Florida Sea Grant and University of Florida IFAS Extension
- Alice Grainger, Coral Restoration Foundation
- Caroline Donovan, NOAA Coral Reef Conservation Program
- Beth Firchau, Association of Zoos and Aquariums
- Katy Cummings, Florida Fish and Wildlife Conservation Commission/FWRI
- Allison Delashmit, Mote Marine Laboratory

FCDOR Communications & Outreach Team

- Cricket Desmarais, Mission Iconic Reefs
- Scott Atwell, Florida Keys National Marine Sanctuary (NOAA)
- Michelle Ashton, Fish and Wildlife Foundation of Florida
- Judy Lang, AGGRA (Caribbean)
- Maurizio Martinelli, Florida Sea Grant
- Caitlin Lustic, The Nature Conservancy
- Melba Gasque, Miami-Dade

Internal Comm Products

Bleaching Event 2023 Information Sheet

Bleaching Event 2023 Information Sheet**
Florida's Coral Reef Resilience Program

Communications & Outreach Team*
Updated August 2, 2023

Table of Contents (click to jump!)

1. The bleaching event
   a. Summary of the key points
   b. More detailed talking points
   c. Resources to share
   d. Media contacts for various regions and organizations

2. Frequently Asked (Tough) Questions

3. Additional topics:
   a. Significance of Florida's Coral Reef
   b. Threats to Florida's Coral Reef
   c. Stony Coral Tissue Loss Disease (SCTLD) Info Sheet (opens another PDF)

**PLEASE NOTE* this is an internal product to help Florida's Coral Reef Resilience Program Disturbance Response. Please use this as a reference for a communication tool, but do not send it directly to reporters or elected officials. Please reach out to the Communications & Outreach Team if you need assistance responding to such requests.*

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** This document is to track qualitative reports on thermal stress, bleaching, and/or coral mortality in Florida – including where we are NOT seeing impacts. This document will be updated by the Florida's Coral Reef Resilience Program Communications & Outreach Team. If you have any questions about the information included herein, please contact Maurizio Martinelli: mmartinelli1@ufl.edu **

September 18th Update

Forecast:

Past Week (11-17 September 2023): Light to gentle breezes continued across the Florida Keys, with values 10 knots or less. Observed rainfall for portions of the Lower and Middle Keys averaged between 0.5 and 2.0", with totals across the Upper Keys approaching 4.0". Rainfall totals for Key West and Marathon airports are 3.5 to 2.9" below normal for the month of September, respectively. Mean daily temperatures averaged 4 to 6 ℉ above normal, with record daily and monthly high temperatures set or tied at Key West and Marathon. The attached NOS time-series plots from Key West and Vaca Key show a linear increase in water temperatures since September 5th, although we have flatlined over the last few days.

Forecast for this Week (18-24 September 2023): More of the same for the next week, with above normal temperatures, light to gentle breezes, and daily and nightly rainfall chances between 30 and 50%. The peak sun angle will fall 12 degrees between September 1st and October 1st, highlighting a reduction in solar input. Sea surface temperatures may have reached their peak. There are no tropical cyclone threats for the Florida Keys through the next seven-days.

Forecast for Week Two (26 September through 02 October): The Climate Prediction Center calls for near normal rain/thunder chances (not shown), and 50-60% chances of above normal temperatures (attached).ances of above normal temperatures (attached).

Internal communication products

Thermal stress, bleaching, and/or coral mortality

As a reminder…

We are building on the successful multi-faceted partner response to SCTLD. The intention is to better blend Florida's broad efforts in coral reef conservation and management with the SCTLD Response.

The Framework's primary goal is to facilitate recovery of FCR to a resilient, self-sustaining ecosystem.

- The 'Disturbance Response' component seeks to maintain a network of working groups for fast mobilization in response to emerging or existing disturbances.
- The 'Recovery' component will focus on a broad understanding of recovery, including threat reduction and ecosystem restoration (i.e., not only SCTLD-susceptible coral restoration, but restoration of a range coral reef-associated organisms).


Thank you!

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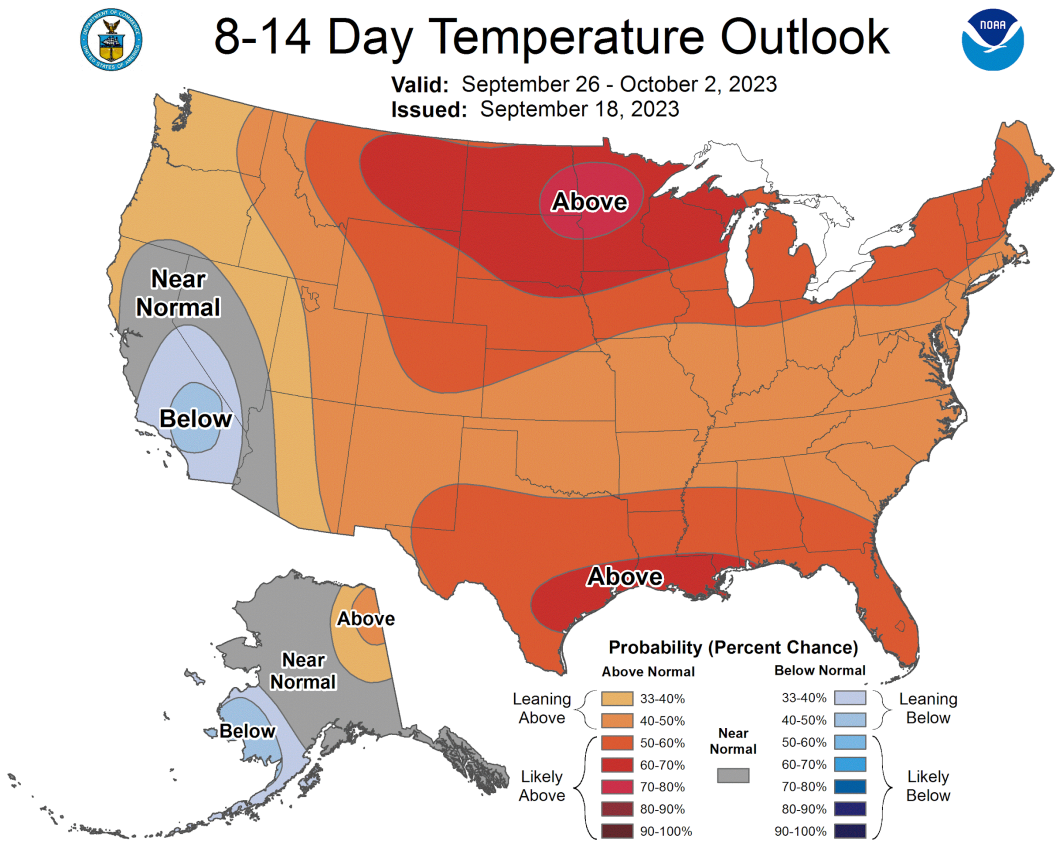
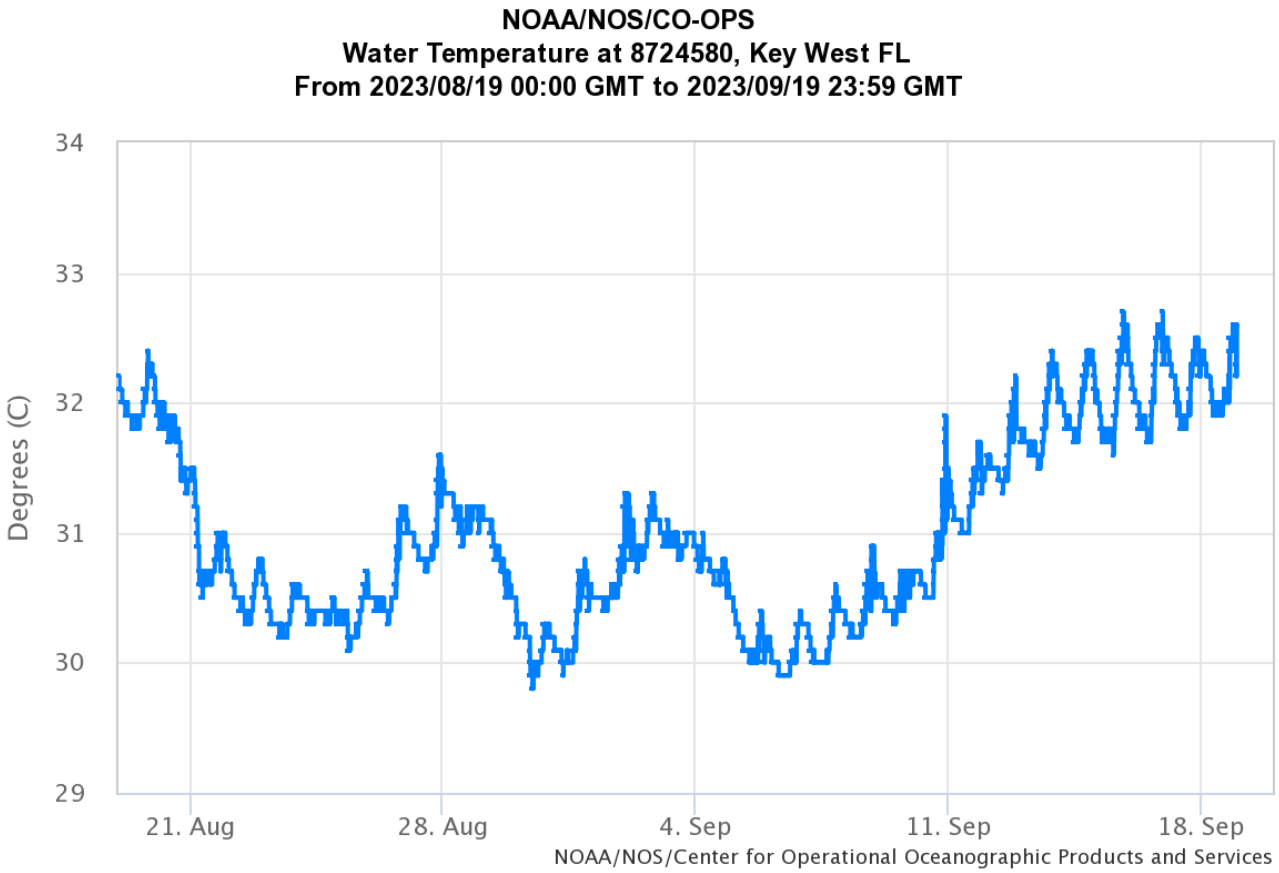
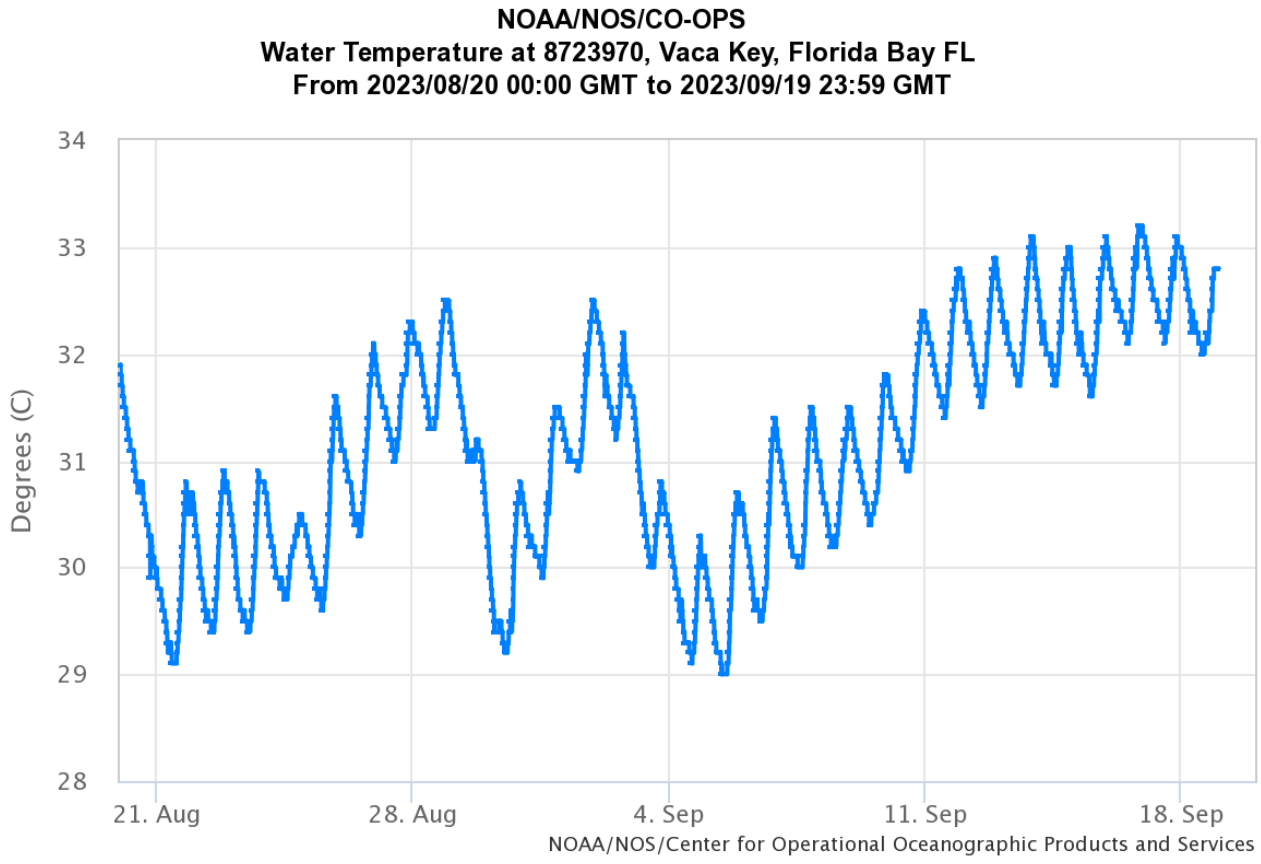






Dry Tortugas

- Folks have just been returning from cruises in the Park, and anecdotal observations have been that things in the Park are not looking great. Shallow sites that were visited seem to have been very hard hit. More info to be shared on the DAC (and will be captured here).

Keys (BIG THANKS TO KAREN N., CORY W., ANDY B.)

- FKNMS BleachWatch Program Current Conditions Report (9/13): https://mote.org/media/uploads/meera/CC_20230913.pdf
- Looe: ACER outplants from a 2019 cohort that were outplanted this past spring seem to be persisting – they are looking very good!
- Sombrero, 9/14: Corals starting to regain color. APAL took a big hit; tissue was sloughing off two months ago, and everything we saw this time around was dead. ACER outplants also essentially gone. But all other wild corals seem fine: they are regaining color and no apparent mortality.
- Coffins patch DCYL patch (24.68201, -80.9709) 9/15: Most corals are stlll bleached or very pale, but regaining color. DCYL were very hard hit, though. There were 12 colonies that had remnant patches of tissue at the beginning of the summer. By Aug 7, two of those had died from bleaching. As of 9/15, there were only 3 still alive and all were actively sloughing tissue from bleaching. I'm not sure this genotype is going to make it. Gorgonians appear to have fared well, though.
- Marker 48 (24.68983, -81.02954), 9/15. Most corals are still pale/bleached, but starting to regain color and some fully recovered. No significant mortality of hard corals was observed, with exception of a few PAST. Gorgonians had >95% mortality.
- Tavernier: Extensive bleaching of nursery-held corals, across all species. Evacuations of some of these corals was completed last week.

Coral ECA (BIG THANKS TO SARAH L., NICK P.)

- DRM surveys conducted at several sites off of Dania Beach, Hollywood, and Hallandale. Water temperatures 85-87 deg C for all sites monitored, regardless of depth. Paling, partial bleaching, and full bleaching observed in small (<10 cm) and medium-sized (10-20 cm) PASTs, SSIDs, AAGAs, SINTs, and PPORs. Also observed bleached Palythoa at 50ft sites, partially bleached PSTR at 10 ft site, and pale DSTO and DLAB at 25 ft sites. Wide taxonomic range of paling/bleaching, but overall abundance of bleached/pale colonies was not high.
- Minimal paling of an ACER patch off of Ft. Lauderdale, 20 ft depth.
- At a dive north of Haulover Inlet, it appeared that only smaller colonies (SSID) were bleached, but larger colonies appeared to be faring well.

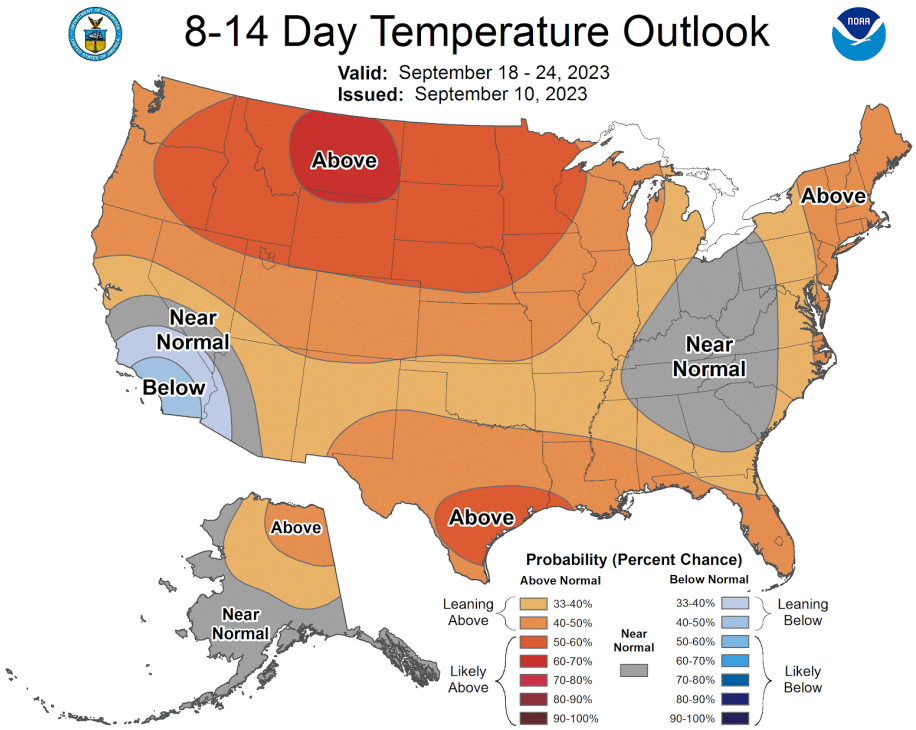
September 11th Update

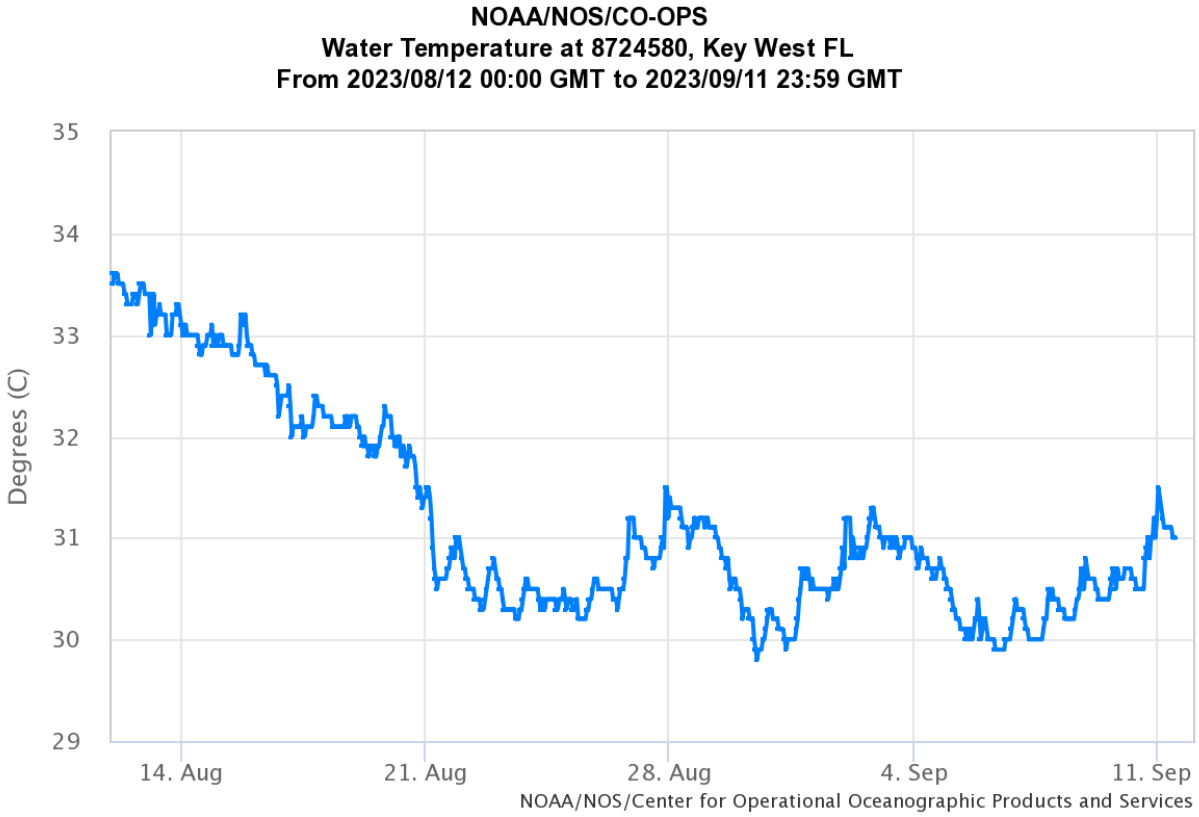
Here is a NOAA/NWS Florida Keys weather and ocean update to support coral bleaching monitoring along the Florida Reef tract: BIG THANK YOU TO CHRIS R.

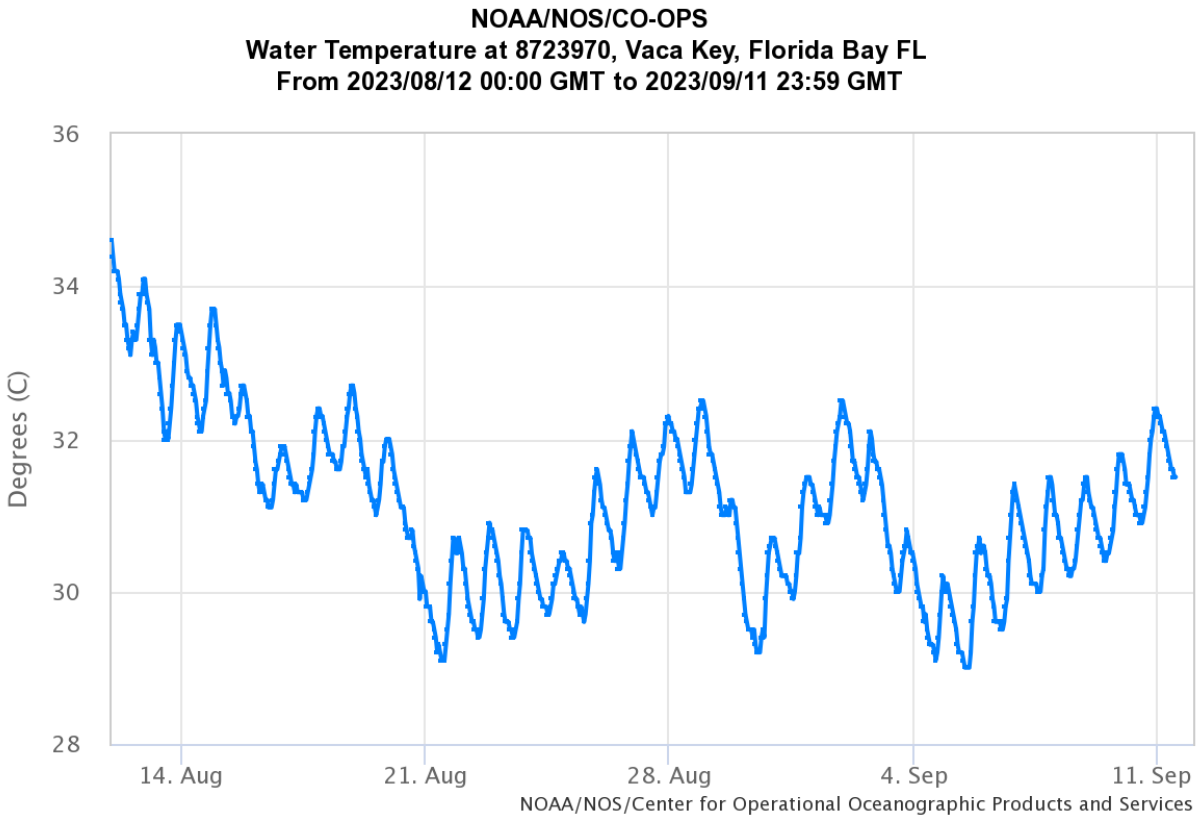
Past Week (04-10 September 2023): Starting out the week, most locations across the Florida Keys measured .10 to .50" of rainfall, accompanied by moderate to fresh easterly breezes. Thereafter, diminished breezes and an anomalous early-September dry pattern took hold across the Keys. The time-series plots included below highlight a linear increase in water temperatures since September 5th as breezes diminished. High temperatures averaged 89 to 94 ℉, with overnight lows 76 to 84 ℉. Mean daily temperatures were slightly above (1 to 3 degrees) normal for this time of year. As of this morning, the sea surface temperatures at Key West Harbor and Vaca Key were 31.0 and 31.5 ℃, respectively.

Forecast for this Week (11-17 September 2023): We remain near the climatological peaks of the Florida Keys rainy season and the Atlantic Hurricane season. Daily and nightly measurable rain chances will average 20 to 40%, with mean daily temperatures averaging slightly above normal. Northeast to east breezes will average 10 knots or less. Northeasterly steering flow below 10 kft will favor storms rolling southwest off the Mainland late each afternoon, Tuesday through Saturday. A tropical wave southeast of the Cabo Verde Islands has a medium chance (60%) of organizing into a tropical depression by the weekend as it moves westward to west-northwestward over the central tropical Atlantic. However, we do not expect any tropical cyclone threats in the Florida Keys during the next seven days (through next Sunday, 17 September).

Forecast for Week Two (18-24 September 2023): The Climate Prediction Center calls for near normal rain/thunder chances (not shown), and 40-50% chances of above normal temperatures.







Marquesas (BIG THANKS TO KATY C.)

- Stony coral bleaching prevalence 50-75% at most sites between 30-55', with a lesser prevalence (10-25%) of paling. Many colonies of MCAV, MYCE, MYAL not exhibiting thermal stress. Sites ranged from mid channel patches off Ballast Key to Halfmoon Shoal
- Some octocoral, Ricordia, anemones also bleaching
- ACER mortality

Keys (BIG THANKS TO KAREN N., CORY W., TRUDY F)

- Looe: Most stony corals are still bleached, however mortality is limited to APAL (wild), ACER (outplanted), and MALC (wild). Some boulder corals are starting to show signs of regaining coloration.
    - Soft corals appear to have fared alright thus far, with limited bleaching or mortality reported at this site.
    - Tissue loss diseases (SCTLD & FLP) also appear to be at much lower prevalence than prior to bleaching.
- American Shoals: Sites between Looe and American Shoals were visited 9/11-12 and conditions appear better than they previous reports – about 50% of corals were showing signs of thermal stress. Most OFAV are only bleaching near the tops of colonies. "[The] reefs seem happier."
- Cheeca Rocks: Bleaching (partial & total) remains widespread at the site, however mortality has slowed and some colonies are starting to regain some coloration. Black band disease has also waned significantly from previous reports – only ~2% of colonies showed signs of BBD (compared to ~8% reported about a month ago). Temp: 85°F.
    - Unfortunately, the gorgonians appear to have experienced near total mortality at this site.
- Elbow Reef: Wild APAL showed range – some colonies were fully pigmented, some were pale, some were bleached, and some were bleached with recent mortality. Water temps 86-87°F.
- Pennekamp: 7 sites were surveyed in the Basin Hill Shoals patch reef system in Pennekamp on 9/1 and 9/7. Conditions are still poor with only 1-5% of the gorgonians alive. Overall 76-100% of the coral colonies on site are in some stage of thermal stress, most being fully bleach. Thermal stress mortality is between 5-15% depending on the site but the rapid algae growth has made it difficult to determine recent and old mortality. Black band was seen on 6 of the 7 sites and 2 of the sites it was seen on the majority of Orbicella colonies. MCAV seems to be doing ok on most of the sites but a few showed recent mortality from BB. More unknown brown and green discolorations are popping up on SINT, SSID, and DLAB.

Coral ECA (BIG THANKS TO SARAH L., TAYLOR T.)

- Emerald Reef (Miami): Signs of paling on small boulder corals and Palythoa.
- Fort Lauderdale (NSU Nursery): Minimal paling & bleaching of ACER. Water temps 85-86°F.

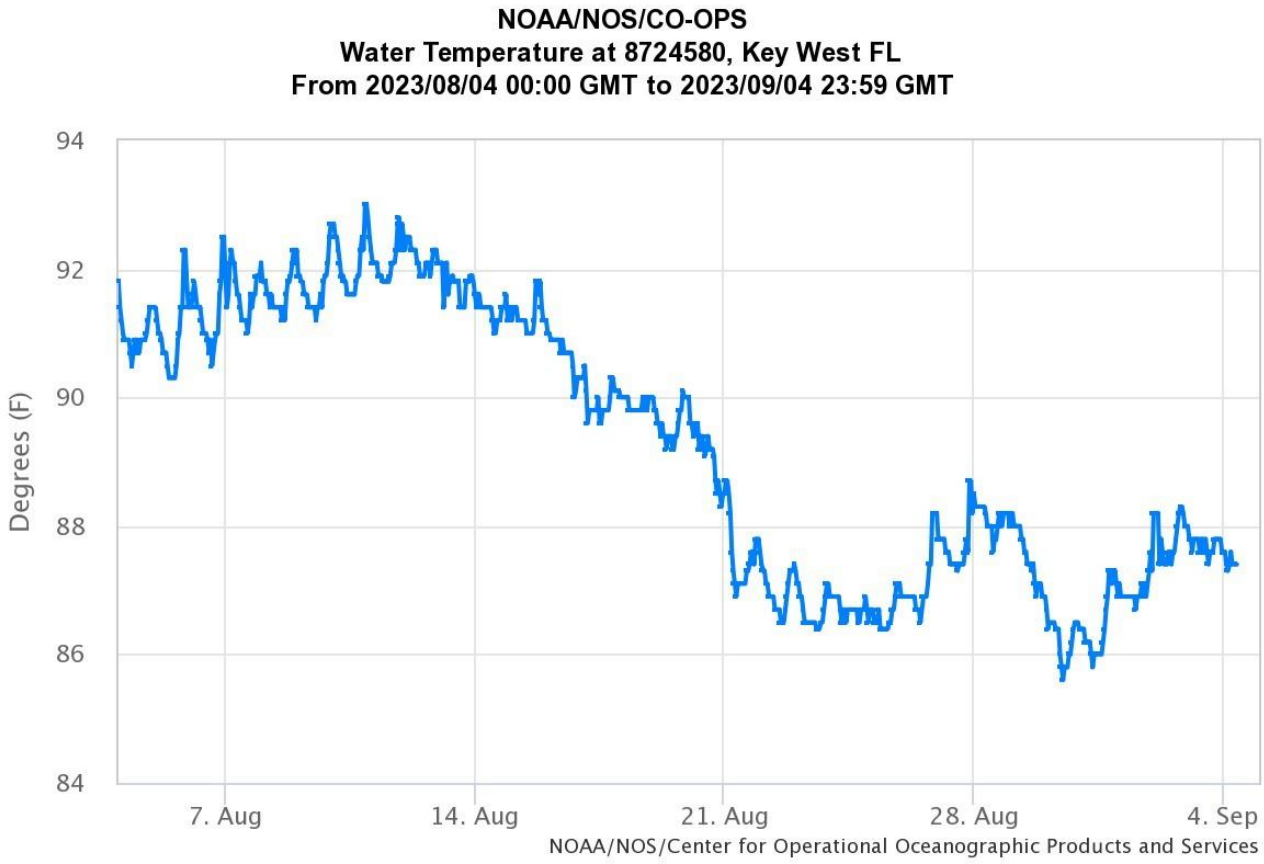
- Hollywood & Dania Beach: Pale ACER, pale and bleached small SSIDs, and partially or fully bleached PAST. Water temps 85-87°F.
- Boca artificial reef: Stony corals showing signs of both bleaching (10-30%) and disease (1-10%). Temps: 86°F
    - Many sponges were reported as “disintegrating” at the site.
- Chalfonte Reef (Palm Beach): No bleaching at this site. The reef looked ‘very healthy’

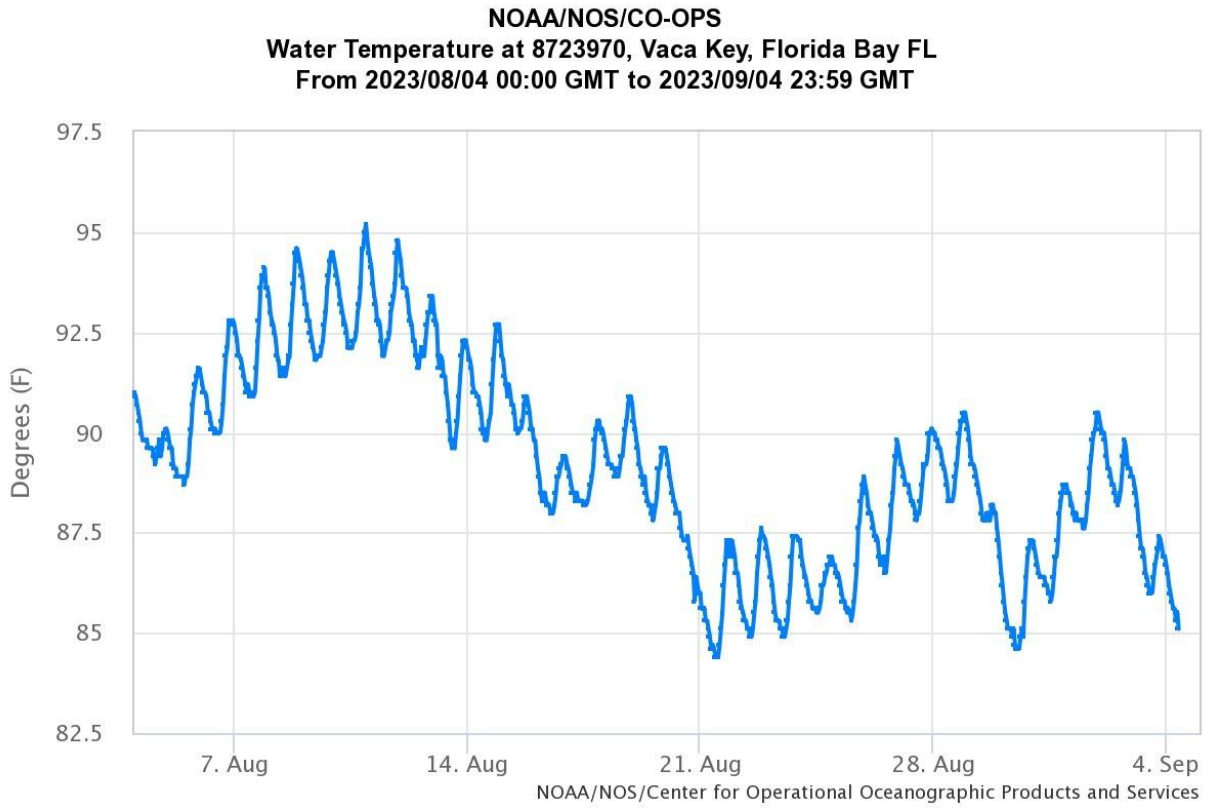
September 6th Update

NOAA/NWS Florida Keys weather and ocean update: BIG THANK YOU TO CHIP K.

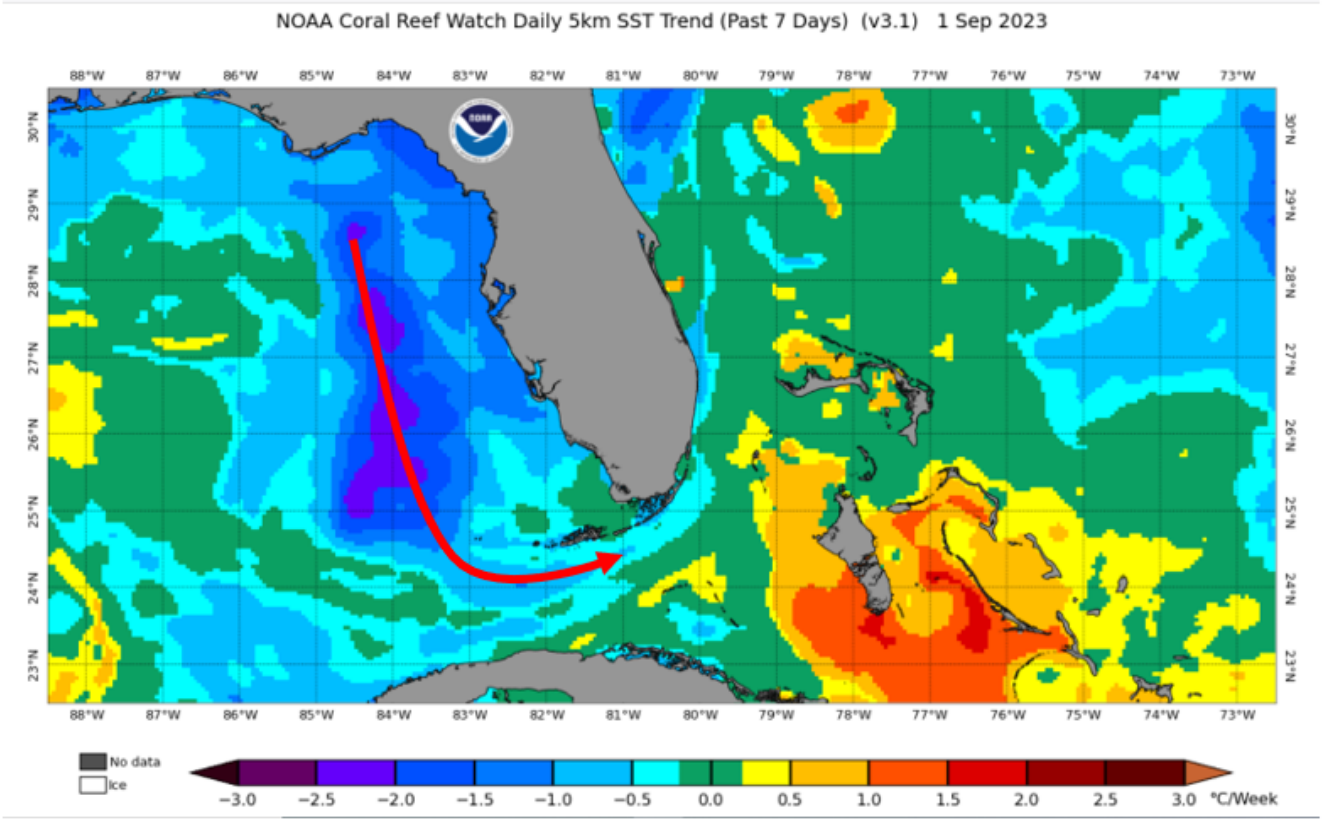
Past Week (27 August-03 September 2023): During the last week, Hurricane Idalia passed by just to the west of the Florida Keys, bringing increased cloud cover, strong breezes, and rainfall. After a few days of lighter breezes, and hot/humid weather, easterly breezes have picked up along with fast-moving rain showers. Air temperatures have been near climatological averages, and certainly below what was observed through most of July and early August. As of this morning, the sea surface temperature readings at Key West Harbor, Vaca Key (Gulf side of Marathon), and Satan Shoal (just off the Florida Reef tract southwest of Key West) were **87, 86, and 86 (degrees F)**, respectively.

Forecast for this week (04-10 September 2023): We are near the climatological peak of the Florida Keys rainy season this week and will be heading into the peak of the Atlantic Hurricane Season during the next several weeks. Daily and nightly measurable rain chances will average 30-40%. High temperatures will average 90-92F, and low temperatures will average 80-83F (very close to climatological averages). Easterly winds will remain elevated (15-20 knots) along the Florida Reef tract today and tonight, and then gradually diminish to near 10 knots later this week. A tropical weather disturbance over the central tropical Atlantic has a high chance (90 percent) of organizing into at least a tropical depression, with a movement toward the west-northwest likely. However, we do not expect any tropical cyclone threat in the Florida Keys during the next seven days (through next Sunday, 10 September).





- There is a cold water mass moving in from the Gulf. Currently, its southern boundary is around Naples, but there is some expectation for that water mass to move around towards the Keys.



Dry Tortugas

- Aug 14-17: 100% pale or bleached. Mortality rates at that point seemed low, although all three Acroporid species were struggling.
    - Did not notice a change in temp from incoming and outgoing tides. Temp logger data coming soon.
    - Photos:
        - https://www.usgs.gov/media/images/bleached-elkhorn-coral-dry-tortugas-national-park
        - https://www.usgs.gov/media/images/elkhorn-coral-suffering-bleaching-dry-tortugas-national-park-pulaski-shoal
        - https://www.usgs.gov/media/images/bleached-elkhorn-coral-under-a-shade-dry-tortugas-national-park-garden-key

Keys (BIG THANKS TO KAREN N., KATY C.)

- Marker 48 (mid-channel off Marathon): Almost everything still bleached, but some color coming back into a few colonies. Near total loss of gorgonians, extensive sponge mortality. Lots of hydroids. Water temp 85.
- Some lower Keys sites in and around Eastern Dry Rocks had been faring decently, with some bleached colonies but others that were only partially bleached, pale, or with normal coloration. Unfortunately, more recent surveys found 100% bleaching (including on colony sides and undersides) at this site.
    - Outplant sites in EDR were showing 100% bleaching or mortality. Similar impacts at Eastern Sambo and Marker 32.
- Bahia Honda patch reefs, forereefs: Widespread coral bleaching still – only a few SSIDs that weren't completely bleached (but were pale). A lot of recent mortality from thermal stress on PAST, SINT, and SSID. A lot of octocoral mortality. Water temperature as read by dive computer was 85-87F depending on the computer.
- Shallow nurseries around Tavernier that had been faring well are now showing 70-80% bleaching.
- Looe Temps: peak of Aug 18 @ 94deg.
- Observed paling SSID, SINT and bleaching MCAV, SBOU, PAST just east of Cottrell Key on September 1st, 2023. Water temp 85/86F (CFK)
- General note: Effective September 5, 2023 NOAA's Office of National Marine Sanctuaries will use its emergency authority to establish a .07 square-mile temporary special use area in the federal waters of Florida Key National Marine Sanctuary, approximately 5 miles southeast of Tavernier, Key Largo. This special use area is necessary to protect Reef Renewal's coral nursery that has been relocated in response to this summer's marine heatwave emergency, which is impacting and likely killing coral reefs in the Florida Keys at an unprecedented rate and scale. This temporary regulation will prohibit entry to the special use area except for continuous transit without interruption. The regulation will last for 60 days, and may be extended once for another 60-days.The location of the temporary special use area can be found in the Marine Sanctuary Explorer app, and below:
    - This rule can be viewed in the federal register here: https://www.federalregister.gov/public-inspection/2023-19036/florida-keys-national-marine-sanctuary-establishment-of-temporary-special-use-area-for-coral-nursery
    - Boundary coordinates are as follows:

Point No	**Latitude**	**Longitude**
1	**24.96934**	**-80.44378**

2	**24.97076**	**-80.43955**
3	**24.96765**	**-80.43759**
4	**24.96612**	**-80.44186**
5	**24.96934**	**-80.44378**

Coral ECA (BIG THANKS TO SARAH L.)

- NSU Nursery, Ft. Lauderdale: Dives conducted at ~20-25ft, water temperature 81/82°F at depth. Minimal bleaching/paling of ACER, about 0.2% of 3181 individuals. 13% of 438 massive corals showed signs of bleaching (SINT and SSID) or paling (MCAV).
- Sunny Isles Beach: Dives conducted at ~20ft and ~50ft, water temperature 86/87°F at depth, around 90°F on surface. Minimal bleaching and paling. A few sporadic small colonies with color loss, but nothing notable.
- Palm Beach near Boca: Widespread paling.
- Hillsborough: A lot of fully bleached encrusting & mounding boulder corals – however, mostly paling and partial bleaching.

August 30 Update

Forecast (BIG THANKS TO CHIP K.)

- * A **Tropical Storm Watch** has been issued for the lower Straits of Florida and the extreme southeastern Gulf of Mexico, including Dry Tortugas National Park. A **Coastal Flood Statement** in effect for all of the Florida Keys for coastal flooding low-lying areas during high tide. Significant coastal flooding is possible on Tuesday and Wednesday.
    - There will be a considerable difference in sustained wind speeds between the the Key Largo-Islamorada Humps-Cay Sal Bank area and the coastal waters from Key West northward and westward (much higher). However, fast-moving squalls will be capable of delivering wind gusts over 40 knots almost anywhere.
    - A combination of the upcoming spring tide with the approaching full moon and Idalia's strong southerly winds may produce coastal flooding with water levels 1 to 2 feet above the average higher high tides over the Middle and Lower Florida Keys. Significant street flooding inland for a few blocks is possible especially along oceanside within lower elevation neighborhoods. Some streets may become impassable.
- According to the newly released NOAA Coral Reef Watch (CRW) experimental 5-kilometer (km) Satellite Current and 60% Probability Coral Bleaching Alert Area, most areas of the Florida Keys National Marine Sanctuary are under a bleaching Alert Level 2, which means significant bleaching expected; mortality likely and the potential exists for continual bleaching alerts if sea temperatures remain elevated in the next few weeks and months.

Dry Tortugas (BIG THANKS ILSA K.)

- As reported previously, there is still extensive bleaching at sites 50' deep or less across stony coral species (with particularly strong impacts noted on APAL), as well as soft corals and other symbiont-laden organisms.
- The Park is experiencing impacts from Hurricane Idalia.

Florida Keys (BIG THANKS TO CORY W., KAREN N., ANDY B., KATY C.)

- Rain and wind in the Keys offered some respite to corals. For short periods, folks recorded drops in temperature to below bleaching thresholds (30.5°C/86.9°F). For example, at Cheeca Rocks, K. Neely recorded 92°F on 8/16 as compared to 84°F on 8/24. On 8/25, for the first time since mass bleaching began, all FKNMS temperature monitored sites were below the bleaching threshold simultaneously. Unfortunately, these cooler periods did not persist – by 8/27, sites were back above bleaching thresholds.
- Cheeca Rocks: stony coral bleaching was still almost total. However, it did appear that some corals might have been gaining some symbionts back in some areas of their tissue (particularly in shaded areas). On the downside, octocoral mortality is almost 100% in the areas visited.
    - Interestingly, basket stars (which normally spend the day curled up in the gorgonians) had just stuck themselves to the side of the live bleached corals.
- West Turtle Shoal and East Washer Woman (two patch reefs off Marathon): 8/25. There was still significant bleaching - the majority of stony corals were bleached, corallimorphs were bleaching, and there were significant impacts to the octocoral populations.
    - Every octocoral observed experienced some level of mortality, with many being completely dead and already overgrown with cyanobacteria, algae, and/or hydroids. Mortality from heat stress was also documented on some stony corals. Water temp recorded as 87°F from a dive computer.
- Mosquito Banks South: 75-100% live coral pale to fully bleached with the majority fully bleached; 5-10% recent mortality due to thermal stress across all stony corals. Only 5-10% gorgonians and sea fans remain alive. Surface temp was 90.5°F.

    - Majority of recent mortality was on SINT, PFUR, PPOR, PSTR, PAST; Least affected corals were SBOU, DSTO, MCAV.
- Cannon Patch: 75-100% live coral pale to fully bleached with the majority fully bleached; 5-10% recent mortality due to thermal stress across all stony corals. Only 10-15% gorgonians and sea fans remain alive. Surface temp 89.6°F
    - Same most/least affected corals as Mosquito Banks South.
- As noted on the last DAC call, a cruise to monitor all seven Mission: Iconic Reefs sites was completed. The data from this cruise are being QA/QC'd before sharing. Quick takehome messages are (1) while impacts from thermal stress were seen at every site, every site also still had living coral. No site has experienced 100% mortality; and (2) upon closer observation, many colonies thought to be 'completely' bleached still had some pigmented tissue on sides and undersides of colonies.

Coral ECA (BIG THANKS TO TAYLOR T.)

- Conditions generally remain more favorable than what has been seen down in the Keys, however bleaching is being reported in Miami-Dade and Broward Counties.
    - Separated Rocks (Broward): 10-30% of stony corals were partially bleached, with an additional 1-10% paled.
    - Hillsboro Ledge (Broward): 1-10% of stony corals were pale.

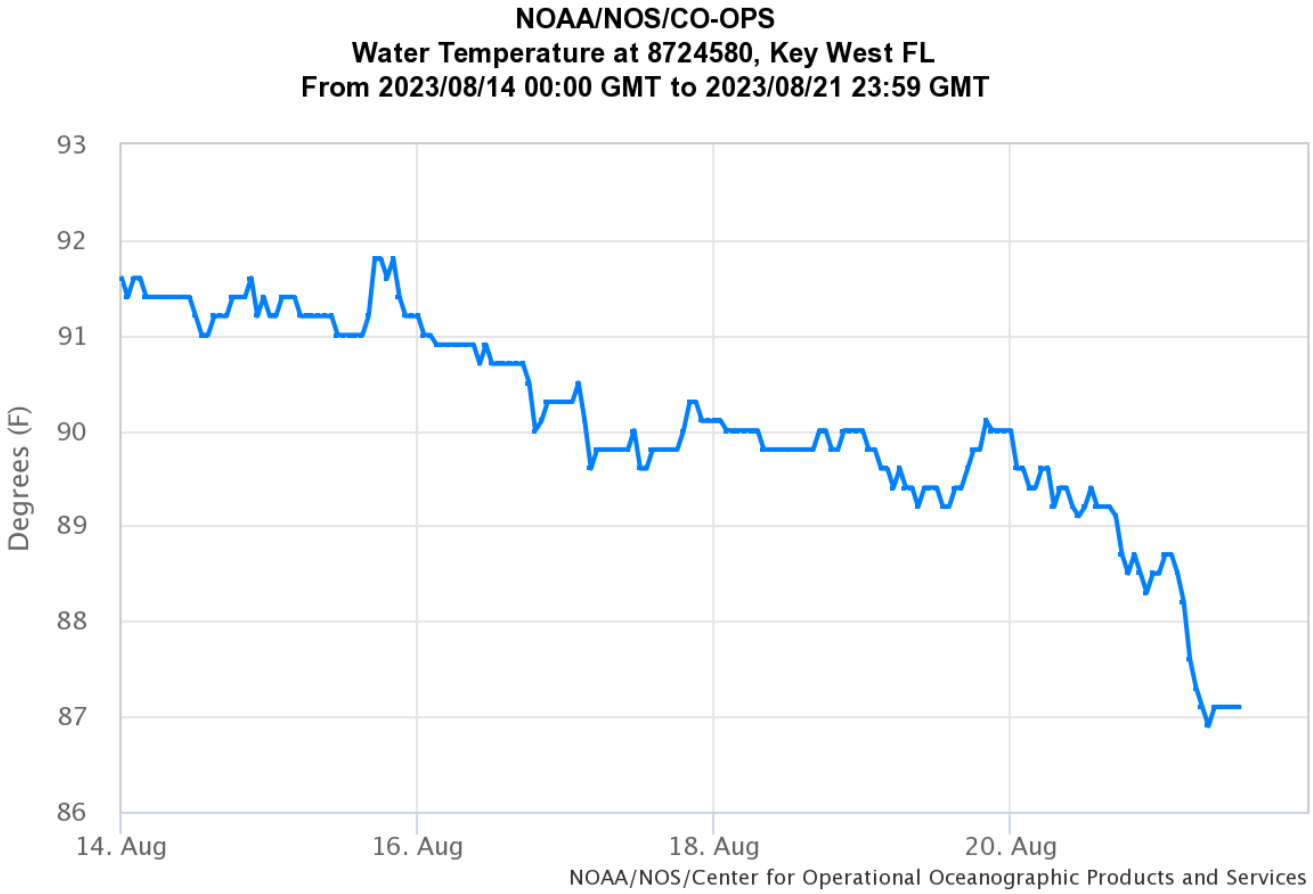
Biscayne National Park (Vanessa McDonough, Amanda Bourque)

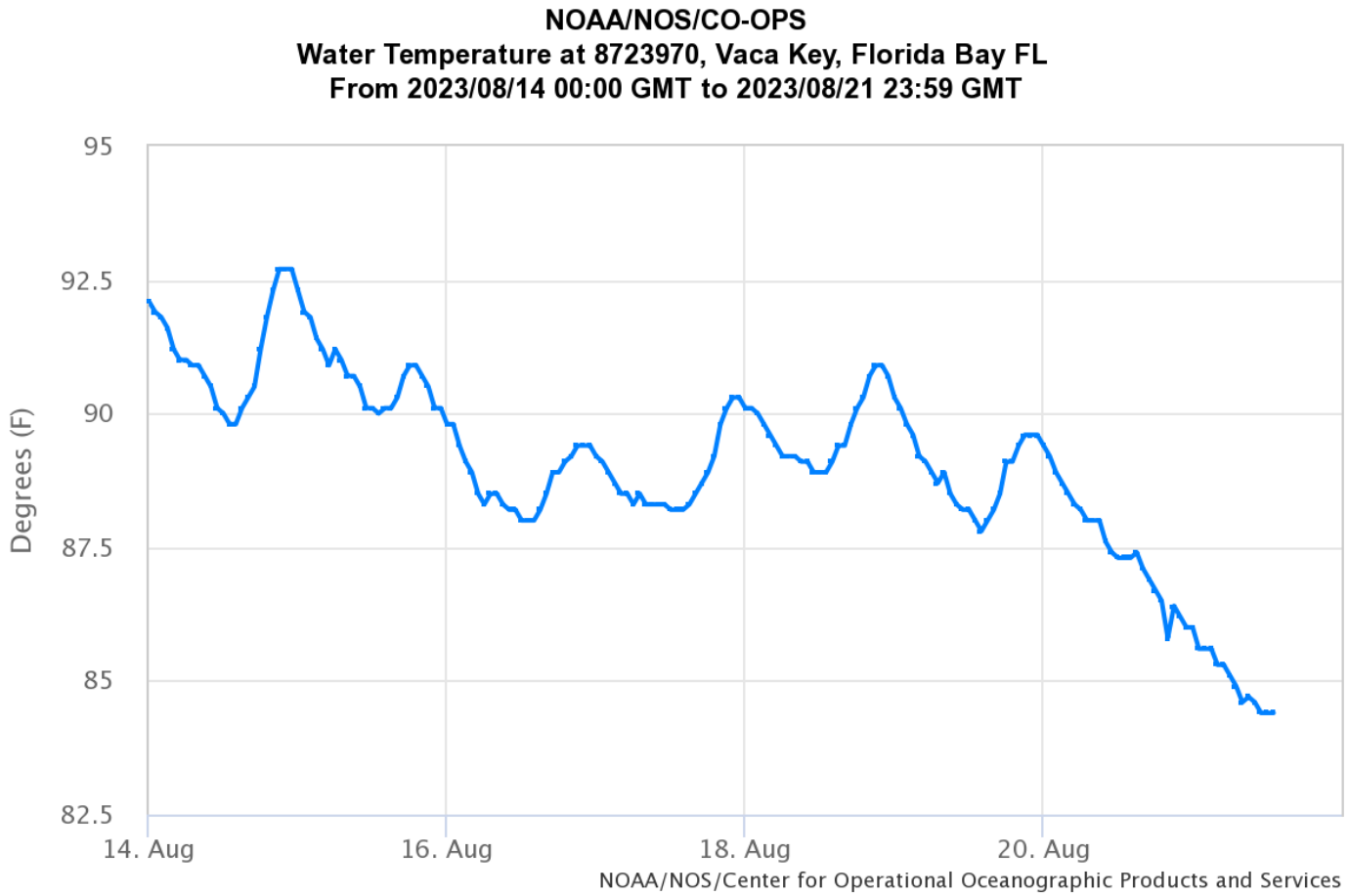
- Widespread and extensive bleaching at shallower, inshore sites.
- At some very shallow (15 feet or less) sites, we are observing up to 100% mortality of soft corals.
- Less extensive/severe bleaching at depths up to 60', water temperatures up to 84 to 86 have been recorded.

August 23 Update

Forecast (BIG THANKS TO CHIP K.)

- **Keys Past Week (14-20 August 2023):** A cloudier, wetter, and breezier weather pattern set in for the first time in several weeks, resulting in above-average cloud cover, widespread rainfall totals of 2-4 inches, and the highest sustained wind speeds observed since early May. Although air temperatures were still slightly above average (highs in the lower 90s, lows near 80), the higher cloud cover, rainfall, and wind speeds resulted in sea surface temperatures dropping between 4-7 degrees F across Florida Keys nearshore waters. As of this morning, the sea surface temperature readings at Key West Harbor, Vaca Key (Gulf side of Marathon), and Satan Shoal (just off the Florida Reef tract southwest of Key West) were 87, 84, and 88, respectively.
- **Keys Forecast for this week (21-27 August 2023):** We are heading into the climatological peak of the Florida Keys rainy season. Daily and nightly measurable rain chances will average 30-40%. High temperatures will average in the lower 90s and low temperatures will average in the lower 80s (near to slightly above average for late August). However, humidity will be a bit lower. Easterly winds will remain elevated (> 10 mph) through mid-week. Although tropical cyclones are active in many parts of the Atlantic Basin, we do not expect any tropical cyclone threat in the Florida Keys during the next seven days.





- Rain and wind are also expected to continue throughout Southeast Florida next week, which should provide continued respite from the marine heatwave throughout the Coral ECA.

Dry Tortugas (BIG THANKS ILSA K.)

- Platform-wide, all coral species, anything with symbionts showed signs of bleaching.
- Extensive bleaching of APAL at monitored sites.
- DCYL also bleached at monitored sites. Some bleached tissue appeared to be turning green – unsure of the cause (endolithic algae?)
- Widespread bleaching/paling at all CREMP sites 50' deep or less. Only site with less than 76-100% bleaching/paling prevalence was Black Coral Rock, which has 31-50% prevalence. Water temps are a bit cooler – 30C at the bottom (at around 80')

Keys (BIG THANKS TO SHELLY K., CORY W. LAD A., KAREN N.)

- August 15 at the Florida Keys National Marine Sanctuary, members and fishing guides were remarking that the Cassiopeia they were seeing looked bleached, one fisher commented it looked like the Cassiopeia on the bottom were large white snowflakes. Shelly saw many small swimming Cassiopia that appeared to have no color.
    - Bay side of Key Largo all bleached.
- Looe & Sombrero: Combination of disease and bleaching causing mortality on FKNMS APAL monitoring sites. One site has only 3 adult colonies remaining, with only ~1% tissue remaining on each colony.
- **8/17/23** Conducted DRM surveys in Mid-Channel off Boca Chica. Approx 85-100% of corals showing thermal stress at these sites, mostly partial bleaching and bleaching with all species. Lots of recent

mortality on PAST and some on SINT and SSID. Most gorgonians (mostly dead) and fire coral had some sort of recent mortality, and some palythoa mortality. Temps were 31-32^{0}C, Vis was 10ft.
- **8/17/23** Western Sambo, about 50% of corals showing thermal stress across all coral species. ACER/APAL outplants all bleached and some recent mortality. A few PAST showing recent mortality, as well as a few fire coral, gorgonians and palythoa. Temps were 31^{0}C.
- **8/18/23** Offshore reefs just west of Looe SPA: about 50% of corals showing thermal stress across all coral species. ACER outplants all bleached and some massive outplants (PCLI and MCAV) were paling/bleaching. Minimal recent mortality on fire coral, gorgonians and palythoa. Temps were 31^{0}C.
- **7/25/23** Newfound Harbor - 12 DHW. 6% of corals totally dead from bleaching. 12% active bleaching-related tissue loss.
- **8/9/23** Cheeca – 12 DHW. 12% corals totally dead from bleaching. 14% with active bleaching-related tissue loss. 8% active BBD.
- Deeper reef near Elbow – still no bleaching. ACER ~ 50ft deep.
- Mission: Iconic Reefs cruise update: folks are working to assimilate their data. They visited all seven sites to monitor restored corals. A lot of mortality and bleaching, but piece of good news: not one site that had total mortality – there were live corals at every site.
    - They found that undersides of corals were not bleached.
    - Plan to repeat the same surveys in early winter to assess the impact of the event and resilience/recovery.

<u>Biscayne National Park (BIG THANKS TO DALTON H., MARTINE D. ILSA K., AMANDA B.)</u>
- Shadow Reef (nearshore): Every wild elkhorn coral we saw was already dead, and only one of our experimental corals remained alive but was completely bleached.
- UM Restoration Site ~2 miles south of Fowey Rocks Lighthouse: 100% of the >1,000 outplanted ACER outplants were bleached or dead. Wild colonies were also bleached, including wild ACER, AAGA, and PCLI.
- Brewster Reef: only some corals completely bleached, and others undergoing paling or partial bleaching. Observed DSTO, MCAV, PAST that were not bleached.
- Nearshore shipwreck with high coral cover: most colonies fully bleached with some pale. Near 100% mortality of soft corals, regardless of species. Many sea plumes had lost their rind and all that remained was the filamentous core. All were in various stages of death/decomposition and covered in something like cyanobacteria.
- Shadow Reef APAL colonies were either fully bleached or dead.
- Brewster and Valentines Reefs had outplants that were not bleached or only partially bleached.
- Ball Buoy and Marker Three. Paling and early stages of bleaching.

<u>Coral ECA (BIG THANKS TO SARAH L., TAYLOR T, DALTON H., KAITLIN A.)</u>
- 8/16/23, Miami Beach, FL: Conducted two SECREMP dives at about 50 ft (outer reef) and 45 ft (middle reef), with temperatures 85-87°F at depth, 90°F on the surface. Very strong current at outer reef site. Minimal bleaching of stony corals observed, just a few small (<10 cm) SSIDs, PASTs, SINTs, and MCAVs.
- Miami: Shallow reefs in southern Miami seeing some bleaching.
- 8/18/23, Hollywood Beach, FL: Several dives 20-25 ft throughout the Hollywood Beach/Dania Beach area, water temperatures ranging from 85-89°F. Lots of cyanobacteria growing on everything. Sporadic paling/bleaching on small (<10 cm) SSIDs and PASTs. Healthy ACER intermixed with diseased (rapid tissue loss or white band potentially), but no bleaching observed. Large APAL colony near Dania Beach pier showed no bleaching. Saw one PSTR with black band disease.
- Broward: Paling colonies (concentrated in shallower areas), but no extensive bleaching.

- Palm Beach: Paling and partial bleaching at shallow DRM sites. Peanut Island – almost all pale and partially bleached. SSIDs bright purple, PSTR, PCLI MCAV showing impacts.
- Martin County & Palm Beach: FAU dive team reported no bleaching. Relatively stable water temps – wind and waves have helped.

August 16 Update

General forecast notes (BIG THANKS TO CHRIS R.)

- NOS SST Gauge at Vaca Key: After peaking from the 9th through 12th, the rains and breezes from Saturday (widespread totals 1.5 to 2.0 inches from Islamorada to Key West) through Sunday have contributed to a subtle downward trend in SST.
- NOS SST Gauge at Key West Harbor: Similar trend as Vaca, although signal noisier due to seiche waves in the FKNMS basin.
- The forecast for the next week will feature two episodes of additional widespread rainfall and cloud cover. The first will be Tuesday through Wednesday, and the second will be Friday night through Sunday. Gentle to moderate breezes will retain physical mixing along the Reef, although breezes will lull somewhat Wednesday through Thursday. Fresh breezes are likely over the weekend, and Small Craft Advisories may be required. All these weather makers bode well for taking the edge off the extreme heat and calm winds.
- The National Hurricane Center highlights two areas of potential development off the coast of Africa. The episodes of dust (Saharan Air Layer) emerging off of Africa tend to end around this time of year, and hence the typical increase in tropical activity through the month of August. These potential systems will need to be monitored over the next week.

Dry Tortugas (BIG THANKS TO KATY C.)

- Extensive bleaching and paling at all sites visited shallower than 50' – nearly all corals on reef tops are paled or bleached.
    - Some bleaching resistance seen at Little Africa – some OANNs may have heat-adapted zooxanthellae as they were darkest on the tops of the colonies!
    - Recent mortality on APAL, APRO, DCYL, and PAST.
- Some octocoral, fire coral, and Palythoa mortality from heat stress
- Only CREMP site without high bleaching prevalence (75-100%) was Black Coral Rock – shallowest depth of 75'. Thermocline with hot water was ~2' above the reef but for now the corals are relatively safe; only saw bleaching on a few OFRA and SSIDs.

Keys (BIG THANKS TO SHELLY K.,CORY W., KAREN N., TRUDY F.)

- Shallow water in the back country off Key West – commercial fishers reports of algal blooms and very hot water. "The water smelled like decay" and they reported dying sponges and sea biscuits.
- Stock Island mid-channel -- ~76-100% of corals showing thermal stress at these sites, mostly partial bleaching and bleaching with all species. Some recent mortality on PAST and SINT. Most gorgonians and fire coral had some sort of recent mortality, and some palythoa mortality. Temp was 32^{0}C, vis was 5-8ft. Report from 08.14.23.
- Jaap Reef (offshore Saddlebunch Keys) – Low vis, but apparent recently mortality on the tops of corals (OFAV, OANN). Appeared to be widespread bleaching and some black band disease. Temp was 31^{0}C, vis was 1ft. Report from 08.16.23.
- Looe Key -- ~75% of corals showing some sort of thermal stress, most were pale or partial bleaching. All APAL and ACER were bleached. Most OFAV were paling and partial bleaching. Some recent mortality on PAST. Bleached and dying gorgonians, fire coral and palythoa. Temp was 31^{0}C, vis was 80ft. Report form 08.11.23.

- Boca Chica mid-channel -- ~85-100% of corals showing thermal stress at the sites, mostly partial bleaching and bleaching with all species. Lots of recent mortality on PAST and some on SINT and SSID. Gorgonians were mostly dead, some with recent mortality; fire coral and palythoa with recent mortality. Temp was 31^0C, vis was 5-8ft. Report from 08.16.23.
- Summerland offshore -- ~76-100% of corals showing thermal stress at these sites, mostly partial bleaching and bleaching with all species. Some recent mortality on PAST and SINT. Lots of black band disease. Most gorgonians and fire coral had some sort of recent mortality, and some palythoa mortality. Temp was 31^0C, vis was 10ft. Report from 08.15.23.
- Cheeca Rocks – Everything partially or totally bleached, with recent and ongoing mortality. Black band disease at higher levels, but SCTLD down to almost nothing. Report from 08.09.23.
- Pennekamp – All reefs had 75-100% showing heat stress, with most fully bleached. Mortality was identified on PAST, PPOR, MFAV, DSTO. Sea fan and gorgonian mortality ranges from moderate to extensive across these reefs, with MBS the least effected currently. SBOU is the only coral species that shows little stress, only a few were paling. At Cannon Patch where there was great rugosity, there were a few SSID that remained healthy looking deeper down in the crevices.
- **Note on Mission Iconic Reefs surveys.** M:IR Field Team is on the Shedd Invertebrate Cruise that will now also include bleach assessments. M:IR Field Team nighttime invertebrate & coral bleaching impact surveys // August 10 - 20. Surveys on wild and outplanted corals will help determine bleaching impacts from the marine heatwave. Survey areas are belt transects: subsections using a standard sampling method (The reef in its entirety will not be surveyed). Original cruise plan was only for the annual nighttime invertebrate surveys on the 7 iconic reef sites. Target species: caribbean king crab, lobster, sea urchins (especially Diadema) and other species that may be ecologically or commercially important (CD)

Biscayne National Park (BIG THANKS TO ANA Z.)

- ACER patch in the vicinity of Ball Buoy completely bleached. Some old mortality, but otherwise colonies still had living tissue. Depth: 9', water temp 87 F.
- Patch reef (15') had completely bleached DLAB, PCLI, PSTR, PPOR, CNAT, AAGA, EFAS, MCAV, OFAV, OANN. I have photos. One healthy MFER.Coordinates for both sites pending. -AZ

Coral ECA (BIG THANKS TO TAYLOR T.)

- Palm Beach Co: 72F around 60-70' and86F at the surface. Some reports of paling and partially bleaching corals for encrusting and brains. Also reports of very healthy corals and a new sighting of a young pillar coral. Many healthy next to partially bleached. Upwelling off Pompan and 64F at 100' and 72F at 60'. Viz across the reef is poor due to mixing. Current in many different directions, and strong. Diving was poor due to poor viz.

August 9 Update

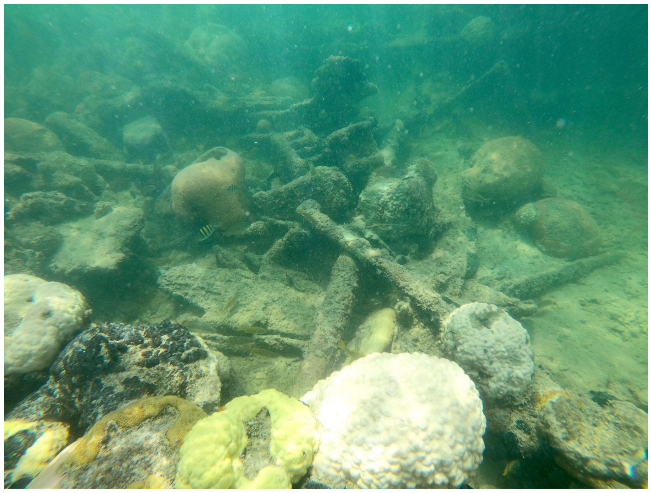
Keys (BIG THANKS TO ANDY B., KAREN N., FWC CORAL TEAM, LAD A., DEREK M.)

- The extremely rapid mortality that was observed primarily in inshore and shallower reefs in the Keys seems to have abated. The sustained, dramatic high temperatures that were coupled with very calm waters peaked July 12-14; some similar temperature spikes are still being reported.
- Bleaching in the Keys is site-specific and patchy. The reports folks are hearing from media that portray the entire Keys as bleached and/or dying are inaccurate. However, the situation is still alarming – bleaching conditions are forecast for the upcoming months.
- Reports from some specific reefs – reports range from mid July to present.
    - Saddlebunch inshore – Bleaching on OFAV, OANN, CNAT, and SSID, with signs of recent mortality.
    - Looe – Extensive bleaching. Extensive mortality Acroporids (wild, outplanted, and in nurseries). Deeper areas of Looe (60-80ft) had some paling and partial bleaching, mostly SSID and PAST.
    - Newfound Harbor – Mixed bag of reports – extensive bleaching and/or paling. Limited mortality reported on PAST, PCLI, and CNAT.
    - Sombrero – Extensive bleaching. 34ºC recorded a couple of times. Extensive mortality Acroporids (at least on the wild colonies).
    - Marathon mid-channel – Extensive paling and bleaching, with some mortality (PAST). All corals showing some sort of thermal stress.
    - Coffins Patch – Paling and some partial bleaching.
    - Cheeca – 100% bleaching reported. Mortality reported on CNAT, DLAB, and OFAV.
    - Hens & Chickens – Extensive paling and bleaching. No mortality reported.
    - Molasses – Paling on one spp. (MALC).
    - Grecian Rocks – Limited bleaching (only on MALC) and paling (esp. on PPOR).
    - Key Largo Dry Rocks – Limited bleaching (only on MALC) and paling.
    - Horseshoe – Extensive bleaching and mortality reported.
    - Northern Dry Rocks – Some paling and bleaching.
    - Elbow – Minimal paling or bleaching. Deeper reefs w/ nice ACER without impacts.
    - Carysfort – Paling on one spp. (MALC). ACER paling to partially bleached.
    - Corals in deeper, offshore reefs (70-80 ft) were reported with paling, but not full bleaching.
- Other reports
    - Extensive soft coral mortality, and reports of sponge bleaching and mortality.
    - Reports at several sites of cyanobacterial blooms; some reefs are being coated what has been described as “icky and slimy film” and “cyanobacteria/algae or something gross”
    - BBD has also been reported from a couple sites that are experiencing bleaching (including mid-channel patch reefs, Cheeca Rocks)

Biscayne National Park (BIG THANKS TO ANA Z., ILSA K. AMANDA B., ROB R.)

- Bleaching was observed in shallower reefs in Biscayne National Park. Around Stiltsville, bleaching of at least five species was observed. From Ana Zangroniz, UF/IFAS Extension & Florida Sea Grant, Miami-Dade County:
    - Bleaching of CNAT, PPOR, SSID, PAST, SBOU on Stiltsville barge on July 28. Photos taken by colleague Ed Pritchard of Miami Eco Adventures. CNATS 90% bleached, but still alive. Lots of recent PAST mortality.
- Marker 3 & Ball Buoy – both APAL sites.
    - Ball Buoy ~July 28 had APAL showing signs of paling and partial bleaching. However, reports from ~Aug 3 was that APAL had normal coloration.
        - Ball Buoy is a large area, so it may be different at different portions of the site.
    - Marker 3 ~Aug 3 had all the acroporids were completely bleached.

- Pics below

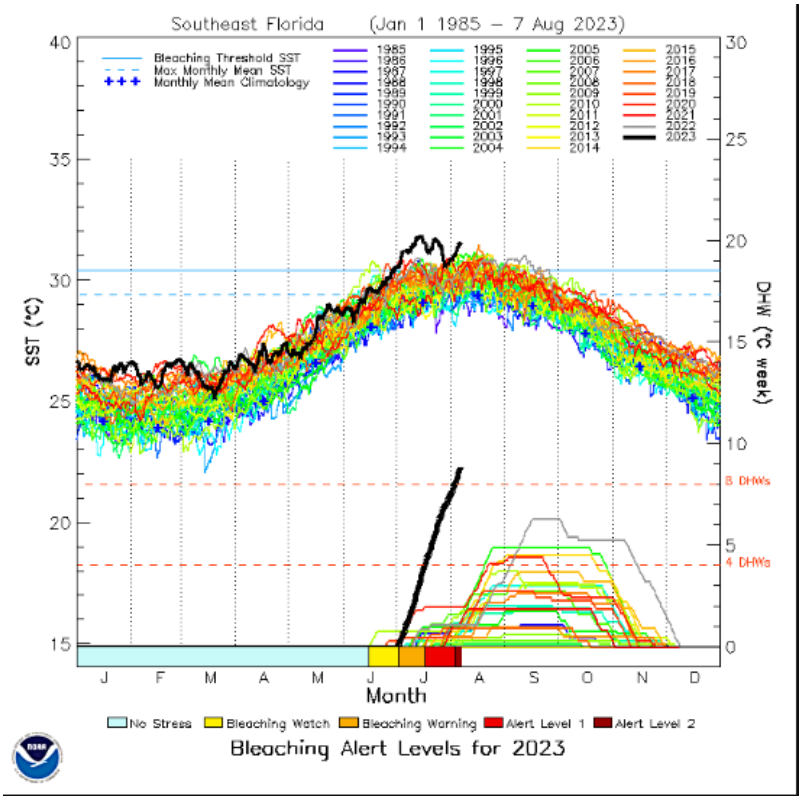


Coral ECA (BIG THANKS TO TAYLOR T., BRIAN W., KATELYN A.)

- Within the ECA, reports of paling/partial bleaching have primarily been shared from Miami-Dade and Broward and Palm Beach Counties (no current update on Martin).
- **Based on climate predictions and field observations, the threat for mass coral bleaching in the Kristin Jacobs Coral Reef Ecosystem Conservation Area (Coral ECA), Miami-Dade to Martin counties, is HIGH as of August 9, 2023. (was MODERATE as of July 12)**
- SSTs are currently higher than the monthly mean climatology of August in Southeast Florida as well as above the MMM and bleaching threshold (MMM+1^{o} C).
    - The ECA had been under a Bleaching Warning for July, which increased to a Bleaching Alert Level 2 on August 3.
    - The current outlooks are:
        - Current to 12 weeks: Bleaching alert level 2 **severe coral bleaching and likely significant coral death**
- 26 reports for the ECA since July 12 and 17 of those reports indicated signs of bleaching. Most reports noted mostly signs of paling and partial bleaching on a few colonies with around 1-30% live coral bleached. Many colonies look healthy and the water temperatures are hovering around 86 on the

surface, 82-84 at 50 ft. and 76 at 100 ft. Cold water upwelling is reaching 56/60 ft. in Palm Beach county mostly. Coral bleaching was observed on all coral types including brain, branching, fleshy, flowering/cup, leaf/plate/sheet, and mound/boulder/encrusting corals. There were also observations of bleaching gorgonians (soft corals), *Palythoa* spp., and fire coral.

- Brian Walker's team has been seeing some bleaching – about 40% of the large corals being monitored are paling (but none fully bleached). Not sure if there is a spatial component (e.g., S corals being more pale). However, a large increase in disease over the past couple months – treated more colonies in the past two months than all of last year.
- *Katelyn from PBC:* Minor bleaching/paling and some corals looked completely fine.4 sites at 46-52 ft. Two additional sites at 8ft to check for corals but did not complete full surveys at those shallow sites.
- Left Photo by BleachWatch Instructor Juliana Grilo (BNP MDC), Right photo from BleachWatch Observer Nikole Heath (Broward County)

- 

Aug. 7, ‘23 multi-year graph NOAA CRW